Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Previously Presented) A method of transcoding a first encoded video signal that has been compressed using a discrete cosine transform (DCT) operation in a first video format into a second encoded video signal that is compressed using a DCT operation in a second video format, different from the first video format, the method comprising:

decoding the first encoded video signal to obtain a stream of DCT coefficient blocks in the first format wherein at least some of the DCT coefficient blocks include run-length coded coefficient values;

reformatting the DCT coefficient blocks obtained from the first encoded video signal into DCT coefficient blocks for the second format without run-length decoding the run-length coded values; and

encoding the second-format DCT coefficient blocks to obtain the second encoded video signal.

2. (Original) A method according to claim 1, wherein a plurality of the DCT coefficient blocks of the first encoded video signal include a plurality of coefficients ordered according to a zigzag scan and the step of reformatting the DCT coefficient blocks obtained from the first encoded video signal into DCT coefficient blocks in the second format includes the step of preserving the zigzag scan order of the plurality of coefficients for a respective plurality of blocks of DCT coefficients in the second format.

3. Canceled.

4. (Currently Amended) A method ~~according to claim 1,~~ of transcoding a first encoded video signal that has been compressed using a discrete cosine transform (DCT) operation in a first video format into a second encoded video signal that is compressed using a DCT operation in a second video format, different from the first video format, wherein[[:]] the

first video signal is encoded according to a digital video (DV) standard having a quantization table defining varying quantization step sizes and the second video signal is encoded according to a moving pictures expert group (MPEG) standard having a quantization matrix~~; and~~ the method comprising:

decoding the first encoded video signal to obtain a stream of DCT coefficient blocks in the first format wherein at least some of the DCT coefficient blocks include run-length coded coefficient values;

reformatting the DCT coefficient blocks obtained from the first encoded video signal into DCT coefficient blocks for the second format without run-length decoding the run-length coded values, wherein the step of reformatting the DCT coefficient blocks obtained from the DV video signal into DCT coefficient blocks for the MPEG video signal includes the steps of:

setting the MPEG quantization matrix to correspond to a finest quantization step size in the DV quantization table; and

multiplying quantized DCT coefficients from the DV video signal by respective factors to generate respective quantized DCT coefficients for the MPEG video signal; and

encoding the second-format DCT coefficient blocks to obtain the second encoded video signal.

5. (Original) A method according to claim 4, wherein the respective factors are respective powers of two and the step of multiplying the quantized DCT coefficients by the respective factors includes the step of shifting each DCT coefficient by a number of bit positions corresponding to the respective power of two.

6. (Original) A method according to claim 1 wherein:

the first video signal is encoded according to a digital video (DV) standard and the second video signal is encoded according to a moving pictures expert group (MPEG) standard;

the DCT blocks of the DV signal are encoded in one of a 248 format and a 88 format and the method further includes the step of reformatting the 248 format DV blocks into 88 format DV blocks, according to the equation:

$C_{88} = FC_{248} + K$

where C_{88} is the block of 88 format DV coefficients, C_{248} is the block of 248 DV coefficients, F a vector defined by the equation:

$$F = \left(\frac{F_1 + F_2}{2a} \; \frac{F_1 - F_2}{2a} \right)$$

where a = 1024/1448, $F_1 = T_8 A_1 T_4^T$, $F_2 = T_8 A_2 T_4^T$, T_8 is the 8 point DCT transformation, T_4 is the 4 point DCT transformation matrix, A_1 and A_2 are matrixes:

$$A_1 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \qquad A_2 = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$, and

$K = (F_1 + F_2)H$

where H is a constant matrix that compensates for a fixed DC offset between the DV coefficients and the MPEG-2 coefficients.

7. (Original) A method for converting a 248 block of DV coefficients into an 88 block of DV coefficients comprising the steps of:

Generating an F vector according to the equation:

$$F = \left(\frac{F_1 + F_2}{2a} \frac{F_1 - F_2}{2a} \right)$$

where a = 1024/1448, $F_1 = T_8 A_1 T_4^T$, $F_2 = T_8 A_2 T_4^T$, T_8 is the 8 point DCT transformation, T_4 is the 4 point DCT transformation matrix and A_1 and A_2 are matrixes:

$$A_1 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \qquad A_2 = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix};$$

Generating a K matrix according to the equation:

$K = (F_1 + F_2)H$

where H is a constant matrix that compensates for a fixed DC offset between the DV coefficients and the MPEG-2 coefficients; and

generating a matrix of 88 DCT coefficients, C_{88}, from a matrix of 248 DCT coefficients, C_{248}, according to the equation:

$C_{88} = FC_{248} + K$.

8. (Original) A method for converting an 88 block of DV coefficients into a 248 block of DV coefficients comprising the steps of:

Generating an F vector according to the equation:

$$F = \left(\frac{F_1 + F_2}{2a} \; \frac{F_1 - F_2}{2a} \right)$$

where a = 1024/1448, $F_1 = T_8 A_1 T_4^T$, $F_2 = T_8 A_2 T_4^T$, T_8 is the 8 point DCT transformation, T_4 is the 4 point DCT transformation matrix and A_1 and A_2 are matrixes:

$$A_1 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \qquad A_2 = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix};$$

Generating a K matrix according to the equation:

$K = (F_1 + F_2)H$

where H is a constant matrix that compensates for a fixed DC offset between the DV coefficients and the MPEG-2 coefficients; and

generating a matrix of 248 DCT coefficients, C_{248}, from a matrix of 88 DCT coefficients, C_{88}, according to the equation:

$C_{248} = F^T C_{88} - F^T K$.

9. (Withdrawn) A method according to claim 1, wherein the first video signal is encoded according to a moving picture experts group (MPEG) standard having only intra-frame encoded frames and having all macroblocks in a 4:2:2 chrominance format with 88 blocks of encoded DCT coefficients, and the second video signal is encoded according to a digital video (DV) standard.

10. (Withdrawn) A method according to claim 9, further including the steps of:

determining whether each MPEG coefficient block represents significant intra-frame motion; and

if it is determined that one of the MPEG coefficient blocks represents significant intra-frame motion, converting the one MPEG coefficient block from 88 format to 248 format before encoding the coefficient block to obtain the DV encoded video signal.

11. (Previously Presented) A computer-readable carrier including computer program instructions, the computer program instructions causing a general purpose computer to perform a method of transcoding a first encoded video signal that has been compressed using a discrete cosine transform (DCT) operation in a first video format into a second encoded video signal that is compressed using a DCT operation in a second video format, different from the first video format, the method comprising:

decoding the first encoded video signal to obtain a stream of DCT coefficient blocks in the first format, wherein at least some of the DCT coefficient blocks include run-length encoded DCT coefficient values;

reformatting the DCT coefficient blocks obtained from the first encoded video signal into DCT coefficient blocks for the second format without run-length decoding the run-length encoded DCT coefficient values; and

encoding the second-format DCT coefficient blocks to obtain the second encoded video signal.

12. (Original) A computer-readable carrier including computer program instructions, the computer program instructions causing a general purpose computer to perform a method for converting a 248 block of DV coefficients into a 88 block of DV coefficients, the method comprising the steps of:

Generating an F vector according to the equation:

$$F = \left(\frac{F_1 + F_2}{2a} \frac{F_1 - F_2}{2a} \right)$$

where a = 1024/1448, $F_1 = T_8 A_1 T_4^T$, $F_2 = T_8 A_2 T_4^T$, T_8 is the 8 point DCT transformation, T_4 is the 4 point DCT transformation matrix and A_1 and A_2 are matrixes that represent respective zigzag scan operations of the 88 DCT and 248 DCT blocks;

Generating a K matrix according to the equation:

$K = (F_1 + F_2)H$

where H is a constant matrix that compensates for a fixed DC offset between the DV coefficients and the MPEG-2 coefficients; and

generating a matrix of 88 DCT coefficients, C_{88}, from a matrix of 248 DCT coefficients, C_{248}, according to the equation:

$C_{88} = FC_{248} + K$.

13. (Original) A computer-readable carrier including computer program instructions, the computer program instructions causing a general purpose computer to perform a method for converting an 88 block of DV coefficients into a 248 block of DV coefficients, the method comprising the steps of:

Generating an F vector according to the equation:

$$F = \left(\frac{F_1 + F_2}{2a} \frac{F_1 - F_2}{2a} \right)$$

where a = 1024/1448, $F_1 = T_8 A_1 T_4^T$, $F_2 = T_8 A_2 T_4^T$, T_8 is the 8 point DCT transformation, T_4 is the 4 point DCT transformation matrix and A_1 and A_2 are matrixes that represent respective zigzag scan operations of the 88 DCT and 248 DCT blocks;

Generating a K matrix according to the equation:

$K = (F_1 + F_2)H$

where H is a constant matrix that compensates for a fixed DC offset between the DV coefficients and the MPEG-2 coefficients; and

generating a matrix of 248 DCT coefficients, C_{248}, from a matrix of 88 DCT coefficients, C_{88}, according to the equation:

$C_{248} = F^T C_{88} - F^T K$.

14. (Original) A method of transcoding a first encoded video signal that has been encoded according to a digital video (DV) standard into a second encoded video signal encoded according to a moving pictures expert group (MPEG) standard, wherein the first encoded video signal has segments of macroblocks, each macroblock including a plurality of blocks having a fixed block size of discrete cosine transform (DCT) coefficients, wherein at least one block of DCT coefficients includes data in excess of that which can be accommodated by the fixed-length block size, and the excess data is identified as overflow coefficient data and is stored in one of a) unused space in other blocks of the macroblock that includes the at least one block and b) unused space in other macroblocks of the segment including the at least one block, the method comprising the steps of:

decoding the first encoded video signal to obtain a stream of macroblocks of DCT coefficient blocks in the DV format, a plurality of lists of overflow macroblock coefficients and a list of overflow segment coefficients;

reformatting the DCT coefficient blocks obtained from the first encoded video signal into DCT coefficient blocks for the MPEG format including the step of, responsive to a data rate control signal for the second signal, selectively setting to zero one of a) the coefficients in the plurality of lists of overflow macroblock coefficients and b) coefficients in the list of overflow segment coefficients to control a data rate of the second signal;

encoding the MPEG-format DCT coefficient blocks to obtain the second encoded video signal; and

monitoring the data rate of the second signal to generate the data rate control signal.

15. (Original) A method according to claim 14, wherein the step of reformatting the DCT coefficient blocks obtained from the DV encoded video signal into DCT coefficient blocks for the MPEG format includes the steps of:

setting to zero only the coefficients in the list of overflow segment coefficients responsive to the data rate control signal having a first value; and

setting to zero both the coefficients in the list of overflow segment coefficients and the coefficients in the plurality of lists of overflow macroblock coefficients responsive to the data rate control signal having a second value, different from the first value.

16. (Original) A method according to claim 15, wherein:

the step of encoding the MPEG format DCT coefficient blocks to obtain the second encoded video signal includes the step of quantizing the MPEG format DCT coefficient blocks according to a quantization scale factor to produce output data representing quantized coefficient values; and

the step of reformatting the DCT coefficient blocks obtained from the DV encoded video signal into DCT coefficient blocks for the MPEG format includes the step of adjusting the quantization scale factor to reduce the output data of the MPEG encoding step in number of bits.

17. (Withdrawn) A method of transcoding a first encoded video signal that has been encoded according to a moving picture experts group (MPEG) standard into a second encoded video signal encoded according to a digital video (DV) standard, wherein the first encoded video signal has a plurality of blocks, each block being encoded in a frame mode and including a plurality of blocks having a discrete cosine transform (DCT) coefficients, and, wherein the second encoded video signal has a plurality of blocks, each block being encoded in one of a frame mode and a field mode the method comprising the steps of:

decoding the first encoded video signal to obtain a stream of DCT coefficient blocks in the MPEG format;

reformatting the DCT coefficient blocks obtained from the first encoded video signal into DCT coefficient blocks for the DV format and in the frame mode;

analyzing each DV format DCT coefficient block to determine if the DCT coefficients represent a corresponding block of pixels having significant intra-frame motion;

if a block of DCT coefficients is determined to represent a block of pixels having significant intra-frame motion, converting the frame mode block of DCT coefficients into a field mode block of DCT coefficients; and

encoding the MPEG-format DCT coefficient blocks to obtain the second encoded video signal.

18. (Withdrawn) A method according to claim 17, wherein the step of analyzing each DV format DCT coefficient block includes the steps of:

calculating a threshold value for a predetermined coefficient; and

comparing the predetermined coefficient of the DCT coefficient block to the calculated threshold value, wherein if the predetermined coefficient is greater than the calculated threshold value, identifying the block as having significant intra-frame motion and if the predetermined coefficient is less than the calculated threshold value, identifying the block as not having significant intra-frame motion.